



forensic science ireland

# Annual Report 2017



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# Foreword

This is my first annual report since joining Forensic Science Ireland in January 2018. I feel very privileged to be working as Director General of FSI and leading such a team of committed and capable professionals. My focus will be on continuing to enhance the services provided by FSI, developing its capabilities and our people. This report represents results and progress made throughout 2017 by the FSI team towards a strategic plan spanning 2015 to 2018. A report on the operation of the DNA Database in 2017, in compliance with the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014, is also included in this publication. The report also refers to the challenges and initiatives that lie ahead as FSI continues its journey of becoming a best-in-class forensic service organisation.

2017 was a year of high contribution and high impact for FSI. We have reported on more cases than ever before and have scaled the DNA Database significantly over the year. The investment and focus on the DNA Database is paying off. It has grown in effectiveness and impact over the year, to the point where 34% of crime stains now have a suspect match from the Database (up from 18% in 2016). FSI have contributed to high-profile cases over the course of the year – from gangland murders, to significant drug seizures, to aggravated assaults. We have worked closely with An Garda Síochána over the year to prioritise where we can have the most impact and deliver results effectively. This has often involved visiting the crime scenes and active engagement in the investigation over the life of the case.

FSI delivered its case reports with a high degree of scientific rigour throughout the year. Operating to international quality standards, critical thinking and peer review processes are cornerstones of the organisation's delivery. We have also participated in cross-organisational best practice and method development workshops across Europe through the European Network of Forensic Service Institutes (ENFSI) and the Association of Forensic Service Providers (AFSP). This will remain a key focus for

the organisation, to ensure we are operating to best international standards and driving improvements in quality, productivity and the breadth of services we offer.

Forensic technologies available today, and the pace of change particularly with DNA analysis techniques, sit in stark contrast with the current state of the laboratories. It is clear that the current infrastructure is not fit-for-purpose for a modern advanced forensics organisation. Great progress was made through 2017 in the design and build of a state-of-the-art forensics facility at Backweston, capable of delivering more advanced forensic capabilities.

Funding was allocated for ground works through 2017, and this preparatory and foundation work has been completed as this report is written. Funding to support construction of the main building has been approved and work is due to commence later this year. FSI has also progressed its internal laboratory information management system and migrated a broad range of IT support to a shared services model with the support of the Department of Justice and Equality. This transition programme is starting to pay dividends in efficiencies and system robustness.

The year ahead presents new challenges and new opportunities. FSI will undergo an international audit to determine readiness for DNA Database exchange across European boundaries. Compliance with the Prüm protocol will allow us to commence exchange with 2 countries in 2018, scaling to many more over the coming years.

Today, casework demand significantly outweighs FSI capacity across disciplines and this gap will grow based on demand trajectories in 2018. Matching staffing and equipment capacity to growing demand and resolving important support gaps are key focus areas of a new workforce plan that has been initiated. Plans are also progressing to merge the laboratory functions of the Garda National Technical Bureau with FSI. This presents a great opportunity for building a broader and integrated forensic service base for the criminal justice system.

This year marks the end of the strategic planning horizon and FSI will develop a new strategic plan over the course of this year. A core theme of this new strategic plan will be developing best-in-class services and capabilities in areas that are most critical and impactful to the Irish criminal justice system. Benchmarking with forensic organisations across Europe has begun, with a view to assessing how we compare, what we can do differently and where we should add new capacity and capabilities. I look forward to sharing more in future reports on our new strategies and how they are progressing.

**Chris Enright,**  
Director General,  
Forensic Science Ireland.

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## Strategic Pillars

### *Excellence in Science*

The report identifies ways in which FSI delivers a quality forensic science service and continues to grow and develop both science and staff to ensure that we are operating to international standards.

### *Customer Service*

FSI interacts with a range of stakeholders. An Garda Síochána are the main front line customers and the service supplied to them is defined in the service level agreement. The range of services and how we have delivered is outlined in the report.

### *Modern Organisation*

This initiative relates to investment in enabling ICT, forensic technologies and laboratory facilities as well as supporting work practices and culture within the organisation. The report outlines progress made in 2017 in the implementation of new IT systems, a fit-for-purpose forensic lab, as well as our work practices.

### *DNA Database*

The implementation of the DNA Database is one of the most important crime fighting tools introduced within the State in recent times. The final section of the report outlines how the effectiveness and impact of this system has grown over 2017.

# Introduction

**F**orensic Science Ireland is an associated office of the Department of Justice and Equality. The people working at FSI are scientists and analysts trained in forensic testing and reporting techniques, supported by administration professionals and number close to one hundred. We work together to deliver to best international standards, independent expert opinion, advice, training and research to support the Irish Criminal Justice system.

Originally known as the Forensic Science Laboratory, FSI was established in 1975 to provide a scientific service to the Criminal Justice System by analysing samples submitted from crime scenes and providing expert evidence in criminal trials. Forty years later some of the original staff are now leading today's FSI team as we embrace the ever-increasing advances in forensic science and continue to fulfil that remit.

In June 2014, President Higgins extended our scope when he signed into law the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014. Under this act, FSI is named as the custodian of that database and our name was changed our name from Forensic Science Laboratory to Forensic Science Ireland to recognise this broader remit.

FSI is currently based in Garda Headquarters in the Phoenix Park but plans to build a new fit-for-purpose building on the scientific campus at Backweston, Celbridge are well advanced. This relocation to suitable facilities will allow FSI continue to develop its scientific remit in order to achieve its stated vision of "Science Supporting Justice".

FSI is also a founding member of the European Network of Forensic Science Institutes (ENFSI) in 1995. Our members are active on all the relevant ENFSI working groups and in recent years have contributed to some of the EU funded ENFSI Monopoly projects. ENFSI was granted Monopoly funding status by the EU in 2009 and they have used this funding to address best practice issues across all disciplines of forensic science.

In addition to our role within the Irish justice system, we have always been conscious of our responsibility to contribute to the global knowledge base. So, while FSI is very much a working service laboratory, our staff are encouraged to contribute to forensic scientific conferences and publish their work, while also accessing the latest forensic scientific thinking from global peers.

FSI is accredited according to ISO17025 and holds an Excellence through People certification.

## Our Management Team



*Director General FSI*

**Chris Enright**



*Director of Services*

**Dr Sean McDermott**



*Director of DNA*

**Dr Geraldine O'Donnell**



*Director of Chemical Sciences*

**Dr Tom Hannigan**

## Our Staff

Forensic Science Ireland is a knowledge-based organisation and the expertise of the staff is its most valuable attribute. Its functioning is an excellent example of the practical application of science in Ireland. Our scientific staff are qualified in a range of scientific disciplines, currently mainly Chemistry and Molecular Biology, many of them to Masters or Ph.D level. Our staff use science in the investigation of crime. The nature of science results in ongoing change and consequently FSI places a significant emphasis on ongoing education and development. This is vital in ensuring that the Criminal Justice system has the benefit of international best practice.

## Our Services

FSI contributes to both the investigation and adjudication of crime within the Irish Criminal Justice System. In broad terms, forensic investigations involve the examination of items recovered from crime scenes and the use of various techniques to link suspects and victims and suspects and scenes. This frequently leads to the elimination of suspects from investigations and there are few major criminal trials that do not feature some contribution from FSI.

The area of most sustained growth is DNA, which is also the discipline of greatest ongoing development. In the DNA area, DNA profiles are extracted from submitted items and compared with reference profiles obtained from suspects to assist the investigation of crimes ranging from burglaries to sexual assaults and murder. Blood Pattern Analysis (BPA) and examination of damage to clothing is also carried out.

In the Chemistry area, many types of trace evidence are recovered and compared with reference samples e.g. glass, paint, fibres, firearm residue. Marks and impressions are also examined e.g. footwear impressions left at crime scenes or manufacturing marks on plastic bags. Debris samples from suspicious fires are analysed for accelerants (e.g. petrol) and suspect materials are analysed for explosives. Chemistry contains the greatest variation in types of materials encountered and the discipline where the greatest diversity of knowledge is needed.

The analysis of materials thought to contravene the Misuse of Drugs Acts constitute the highest number of submissions to FSI. The increase in the abuse of New Psychoactive Substances puts additional pressure in this area where the analysis of new materials poses analytical challenges.

The bulk of cases for FSI analysis are submitted by An Garda Síochána but material is also received from Garda Síochána Ombudsman Commission (GSOC), Customs & Excise, and Military Police. Cases are accepted by FSI reception/ case intake staff who ensure that items are safely and securely stored or passed directly to a scientist depending on the situation. In either situation the chain of custody is carefully monitored.

In addition to analysing samples in the laboratory, staff from FSI provide professional advice and training on the appropriate samples to be taken from crime scenes and individuals and in some circumstances attend crime scenes. We also operate an out-of-hours service for situations where investigating Gardaí need access to immediate information or when it is necessary to visit crime scenes

We work closely with An Garda Síochána on cases where our findings have the potential to make a difference and provide value for money for the State, by ensuring that our expertise and resources are used in instances where they are more likely to include or exclude suspects rather than provide findings that are neutral.

Staff act as expert witnesses in criminal trials. There is the potential for this to occur in all cases, but court attendance is required from approximately 1% of cases across the laboratory. Some areas of work are more likely to result in court cases than others. Attendance at court can involve robust defence of scientific finding but more often the witness is required to outline routine processes related to continuity or laboratory procedures.

The following sections outline progress against the goals defined in the Strategy Statement 2015-2018.



**EXCELLENCE  
IN SCIENCE**

# Goal 1

## Provide a quality forensic science service

FSI used ISO 17025 throughout the year to manage continuous improvement. Four management review meetings were held with senior staff to manage this system in 2017. These meetings recorded the various sources of feedback and follow up activity. The annual assessment by INAB took place in November 2017 with the successful outcome of maintenance of accreditation for our existing scope and the awarding of extension to scope and flexiscope for the following:

- Quantitative analysis of cocaine by GC-MS using the Agilent 7890B GC with 7693 auto injector and Mass Hunter software
- The Phadebas® Forensic Press test for the detection of salivary – amylase; and
- Qualitative analysis of Phenazepam.

2017 also saw the introduction of a quality management software system to consolidate various quality system functions with a single piece of software, eliminate paper based quality processes and increase operational efficiency.

## Goal 2

### Anticipate future technological opportunities and their applications to casework

Several new techniques and processes were implemented in FSI over the year to improve forensic capability and effectiveness. Some of the highlights for 2017 include:

- Introduction & validation of a new DNA commercial kit for the testing of blood
- A new DNA instrument for the rapid generation of DNA profiles has been commissioned, validated and is now supporting case work.
- New DNA sequencing instrumentation has been commissioned and validated and now supporting case work.
- Electronic streamlining for the transmission of DNA profiles to other countries through the police communication channel Interpol has been implemented.
- During 2017, FSI continued to identify and characterise new psychoactive substances (NPS) encountered in casework and liaise with the Health Research Board and the European Monitoring Centre for Dangerous Drugs of Abuse (EMCDDA). Approximately 15 such substances were identified in 2017.
- An automated system for producing high quality images to scale of objects containing footwear impressions e.g. gel lifts from crime scenes (the "Trasoscan") was purchased and introduced into casework. This has allowed us to improve the service we offer in criminal investigations where footwear impressions are left at a scene e.g. burglaries.
- Methods for confirming the presence of common drugs of abuse in biological samples by LC/MS/MS were validated and will be introduced into case work at the start of 2018.

This applies mainly to sexual assault cases. Previously, such specimens were screened for common drugs of abuse. If confirmation for court purposes was required, the specimens were sent to another laboratory for further analysis.

- Work was completed by a DIT student on the Optimisation of an SPME method for accelerant analysis.

One of the mechanisms to ensure that the science in use is up to date is active participation in the European Network of Forensic Science Institutes (ENFSI). Staff attend annual meeting of the technical working groups on DNA, Drugs, Fibres, Fires, Paint and Glass, Marks, Explosives and Firearm Residue. FSI is also active in the quality liaison group, the R&D standing committee and the Director General attends the overarching ENFSI meeting. This network facilitates the provision of proficiency trials and best practice sharing.

ENFSI is also working on projects in relation to the formation of 'Forensic Science Area 2020' as promoted by the EU. This includes a number of EU funded Monopoly projects to formulate databases among other things. One of the Monopoly projects is carrying out research on background DNA.

FSI has also been active in the Association of Forensic Science Providers (AFSP). The DG attends the strategic meetings and relevant staff the various working groups. The quality group collaborates to produce proficiency trials and collaborative exercises that are not available commercially and the Body Fluid Forum collaborates to carry out background research to assist interpretation.

## Goal 3

### Increase support for learning opportunities

- Online journals are available at FSI to support on-going learning in fields of interest. Discipline meetings across FSI also serve to encourage learning and development in that domain.
- Several staff across disciplines have participated in international events through ENFSI or AFSP, with many attending at locations across Europe.
- FSI had 2 staff members participate in a leadership development programme with the Institute of Public Administration. We had 5 people completing advanced programmes on the Evaluation of Forensic Evidence at the University of Lausanne and supported 1 staff member pursuing a diploma at the Irish Management Institute. Several others are pursuing the management and leadership development programme organised through the Department of Justice & Equality.

#### Publications

FSI staff members have contributed to the global forensic knowledge base through the year, with several papers published. These papers are outlined in Appendix 1.

#### Presentations

Staff from FSI deliver many presentations as part of their ongoing work – training courses to Gardaí, outreach lectures to students and other public groups and presentations to various visitors. A sample of presentations follows:

“Forensic Science in Ireland: An Overview”, Presentation by Dr. T. Hannigan at Galway-Mayo Institute of Technology (GMIT), 24/3/2017.

‘Drugs and Court’, John Power, Fraser Johnson. Presented at 23rd ENFSI Drugs Working Group Meeting, Linköping, Sweden, 9-11th May 2017.

“Some Issues in Drugs and DNA”, Presentation by Dr. T. Hannigan to State Solicitors, Hodson Bay Hotel, Athlone, 15/7/2017.

## Goal 4

### Ensure that we are operating to best international practice

A benchmarking project supported by ENFSI to compare management metrics has started in 2017. This will continue in 2018 and will be supplemented by additional benchmarking exercises.



**CUSTOMER  
SERVICE**

# Goal 1

## Deliver excellent Customer Service to our clients

The service of FSI is based on a service level agreement signed by the Commissioner of An Garda Síochána and the Director General of FSI. The document highlights the core guiding principles that underpins its service delivery – quality, prioritisation for maximum impact and continuous improvement.

1. Quality: FSI ensures that the services will be performed in a professional manner consistent with relevant international industry standards and subject to external validation.
2. Prioritisation for Maximum Impact: FSI prioritises cases based on importance to the client, forensic potential and bandwidth within the system. Throughout 2017 FSI capacity (people, infrastructure and equipment) was insufficient for demand and a collaborative prioritisation approach was used throughout 2017.
3. Continuous Improvement: FSI holds an ethos of continuous improvement and will strive to improve the range, quality and throughput of services over time.

A case prioritisation system is in operation as outlined in Figure 1 below, where the cases of high public interest and where the contribution of science is clear get highest priority and those of low public interest where the contribution of science is neutral get little or no attention.

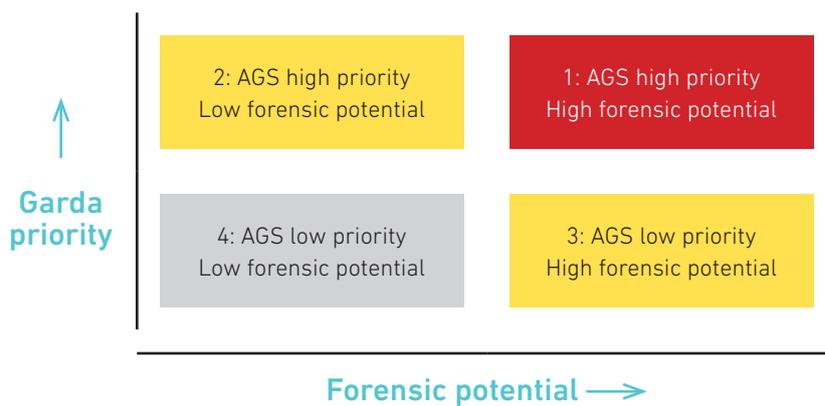


Figure 1. Factors for consideration in case prioritization.

## Case numbers

Case numbers reported relative to 2016 are shown in Table 1 below.

Service	2016 Case Reports	2017 Case Reports
Drugs	6,041	8,456
Chemistry	612	623
Toxicology	180	276
DNA Cases	2,584	4,000
DNA Reference Samples	9,048	14,000
Total Cases Reported (excluding reference samples)	9,417	13,355

*Table 1*

This reported output is based on submissions to FSI of 15,200 in 2017, compared to 14,008 in 2016.

- There is a significant increase in cases reported compared to the previous year. This was enabled through an increase in staffing and the implementation of more productive techniques and processes within FSI.
- There is significant variation in the complexity and scale of cases supported by FSI. The case load in 2017 included a number of high profile cases which took considerable resources over several months because of their size and complexity. These include major drug seizures and investigations into gangland murders over the course of the year, often requiring extensive DNA work. FSI prioritised these cases and offered a fast, reactive and extensive service to support these investigations. This focus did impact on the delivery of some routine case work.
- The demand for case work throughout 2017 significantly exceeded the capacity available. This resulted in significant backlogs across all case types, and especially so in the drugs area. While the right prioritisation and focus is being given to the high profile cases, addressing our backlogs and finding ways to better match capacity to demand will be a key focus for FSI in 2018. This will be needed to provide more predictable turnaround times across all service types.

The following graphs illustrate the range of analyses completed in 2017, with some associated trends.

The trends in Drug submissions from 2007 to 2017 are shown in Figure 2 below.

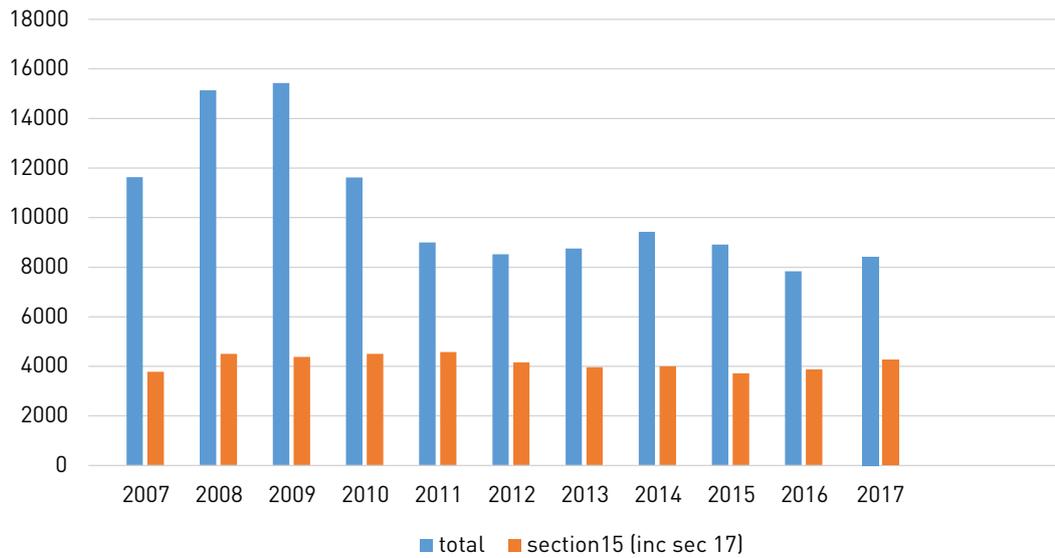


Figure 2 - Trends in Drug submissions in ten year period (2007 to 2017)

This shows the increase in submissions compared to 2016, as well as an increase in more complex case submissions (section 15 & 17).

The types of drug analysed in 2017, illustrated in Figure 3 below, remains largely consistent with 2016. The percentage of cases analysed containing heroin has fallen from 21% to 14%, whereas the percentage containing Powder (usually Cocaine) has increased from 25% to 30% and the percentage containing Tablets (usually MDMA) has increased from 12% to 16%.

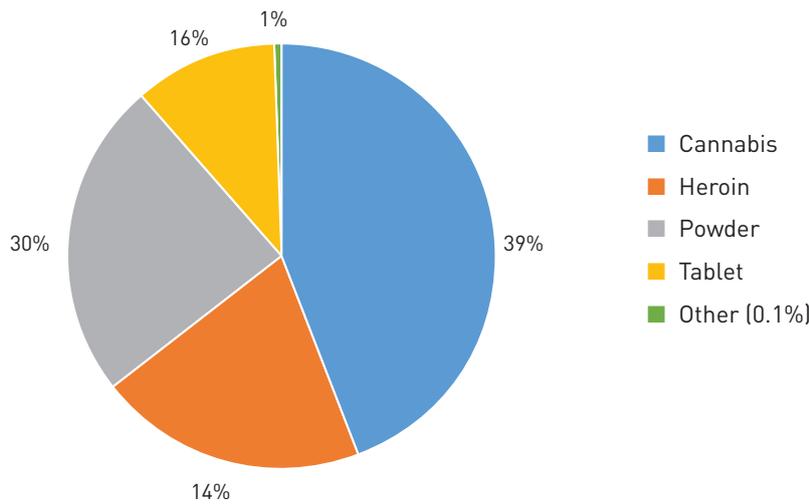


Figure 3 - Different Types of Analysis reported by the Drugs Section 2017

Examples of the types of Chemistry cases examined in 2017 are illustrated in Figure 4 below. This shows the broad range of specialities and case types examined by the Chemistry section.

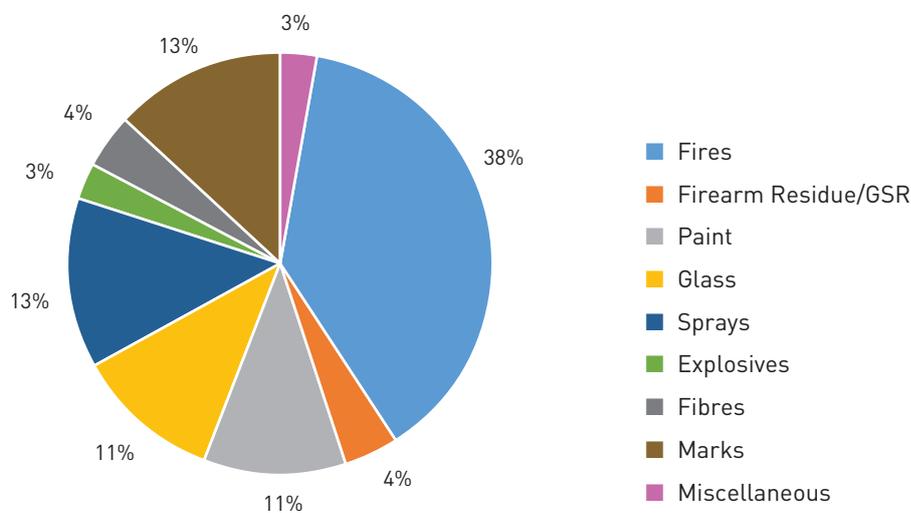
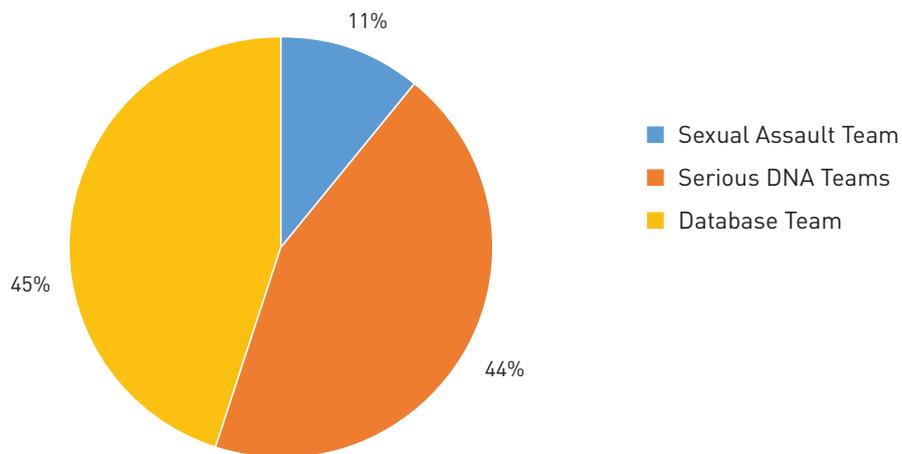


Figure 4 - Different Types of Analysis reported by the Chemistry Section 2017

Figure 5 shows the different types of cases reported by the DNA section in 2017 (and proportions). The team structures reflect the wide range of cases where DNA is useful. The sexual assault team work on cases involving a sexual assault. The Database team work on volume crime cases – these include burglaries, unauthorised takings and cases where only 1-2 exhibits are submitted. As the name implies the serious teams work on cases involving injury to people- these include murders, gangland killings and assaults.



*Figure 5 - Proportions of Cases reported by the Four DNA Teams in 2017*

## Court cases

A percentage of the cases examined result in court cases each year. Frequently these court cases relate to reports issued in earlier years. Staff from FSI attended court on 104 occasions in 2017. The types of cases involved are varied as casework itself and range from armed robbery, burglary, explosives and firearms as well as murders, sexual assaults and drugs. In all cases, scientific evidence was presented professionally and objectively and subjected to the rigour of cross-examination.

## Defence visits

Various scientists employed by the defence visited FSI on 49 occasions in 2017. The majority of these visits related to the re-examination of DNA evidence and on occasion, involved FSI re-profiling the samples at the request of the defence. Chemistry cases involving explosives, pepper sprays, glass, firearm residue, matching footprints and matching fibres was the second most common evidence type examined. FSI also facilitated visits related to the re-examination of drugs seizures. No issues arose in subsequent court cases arising from these examinations.

## Goal 2

### Promote the practice of presumptive testing of Section 3 Cannabis and Cocaine cases by An Garda Síochána

Presumptive Drug Testing (PDT) was introduced by Garda Circular 23/11 in 2011. It is a system, widely used in the UK and other countries, whereby a trained Garda carries out a chemical test, using a commercially available test kit, to confirm that a suspect material is a specific controlled drug. The drugs covered by Circular 23/11 are cannabis (herb or resin) and cocaine. PDT applies only to offences under Section 3 of the Misuse of Drugs Acts (personal possession). Gardaí carrying out the tests are trained by FSI (at least 300 have been trained to date) and the kits used were evaluated by FSI before being chosen. The scheme was introduced to reduce the number of Section 3 cases being submitted to FSI to allow us to focus our resources on the more serious Section 15 (dealing) and Section 17 (cultivation) cases. However, the scheme has been only partly successful. The number of Section 3 cases submitted to FSI remains stable at about 4000 per year. In 2017, 4282 Section 3 cases were submitted and, of these, 1700 were cannabis cases which could have been dealt with by PDT. Deployment and acceptance issues associated with PDT are being evaluated at present. FSI continues to engage with An Garda Síochána, the Office of the Director of Public Prosecutions, and the Department of Justice and Equality in efforts to improve the effectiveness of the PDT system.

## Goal 3

### Provide “at scene” attendance and out of hours service for major or urgent cases

The system to facilitate an out of hours service continued in 2017. Each scientist carries an on-call phone for a week at a time and a smaller group of 20 persons are available to attend scenes or to carry out necessary urgent laboratory work. This service was availed of on 23 occasions over the course of 2017 – covering the full gamut of case types. FSI attended 6 crime scenes to provide specialist knowledge, particularly for murder investigations and clandestine drug laboratories.

## Goal 4

**Contribute to Cold Case reviews so that maximum benefit is obtained from modern scientific techniques**

FSI participated in the Cold Case investigation team, managed by An Garda Síochána, throughout 2017. DNA techniques were effective in solving one missing person case in 2017. In this case, DNA from siblings was used to identify a man buried unidentified 10 years previously. In this case, advances in DNA techniques have helped bring closure to families experiencing a very difficult loss. FSI also participated in the National Missing Persons Day at Farmleigh House in December and will continue to focus on this in the years ahead.

## Goal 5a

**Ensure that evidence in Court is given in a consistent well-informed manner**

An expert witness training course was delivered to scientific staff in March 2017. This will be an on-going process for new staff as well as a continuous learning focus.

## Goal 5b

**Continue to provide high quality credible expert opinion in reports and in court**

The process of peer reviewing all reports issued by FSI continued in 2017 with a particular emphasis on checking that the evidence presented would not be open to misinterpretation by the end users. When appropriate, evaluative opinion is used in reports. Most reports involving trace evidence are reported evaluatively. Some cases involving DNA also lend themselves to be reported evaluatively and where this is not possible and the evidence may be misleading a caveat is added to DNA reports to highlight that the rarity of the profile is not synonymous with the relevance or significance in the context of the case.

## Goal 5C

### Improve productivity through increased use of summary reports

Summary reports were rolled out for smaller drug cases and also in smaller volume crime reports in 2017.

## Goal 5d

### The provision of joint cross sectional reports in appropriate cases

FSI added a service to provide drug confirmation results for sexual assault investigation in 2017. This facilitates a valuable, more integrated reporting service for sexual assault cases.





# MODERN ORGANISATION

## Goal 1

### To improve our Information and Communication Technology (ICT) system and facilities

The Laboratory Information Management System (LIMS), first introduced in 2016, has stabilised throughout 2017. The system has provided some significant benefits in information management in new disciplines and has supported electronic transfer of case reports. The system is being refined to help improve workflows for other disciplines, such as drugs analysis to help productivity and efficiency.

FSI also moved its servers, including the DNA Database to a shared service model with the support of the Department of Justice and Equality.

As the remit of FSI broadens across other forensic disciplines, we will need to further invest in ICT systems that support forensic analysis and data capture, lab-based information management systems and broadening our electronic communication processes.

## Goal 2

### Purpose built facilities suitable for a 21st century forensic science institute

It has been broadly acknowledged, within Ireland and across the forensic community in Europe, that the current accommodation and facilities for FSI have fallen well below international standards and are not fit-for-purpose. This situation sits in stark contrast to the continuous development of sensitive and discerning DNA and chemical analysis techniques and the obligations on FSI to exchange quality DNA data with the other 26 nations under the Prüm treaty.

With the support of the Minister for Justice and Equality, significant progress was made in 2017 to realise a purpose-built facility at Backweston, County Kildare. Preparatory ground works are now complete, and designs for the main building are being finalised by the Office of Public Works, with a plan to issue tender documents in Q2 of 2018.

## Goal 3

### Facilitate a culture that supports the achievement of best HR practice and professional development

- 2017 was a year of transition for FSI. Two long-serving members of the senior management team retired after many years of contribution to FSI and the broader forensic community. Additionally, while some money was allocated for staffing, not all new staff have joined FSI yet. Despite these challenges, FSI staff covered many of the significant gaps arising, and maintained and improved case loads over the year. This is a testament to the commitment and professionalism of the FSI organisation. Discussions in relation to workforce planning have been started with Department of Justice and Equality, with a focus on current and future needs of the organisation.
- Competitions were held for some promotional posts and some additional scientists were recruited and started within 2017.
- Staff engagement is supported through an open and inclusive approach to business planning and business review. A weekly newsletter is circulated to share topics of interest across FSI and stimulate discussions of interest.
- Discipline meetings encourage discussion on all scientific matters and issues related to improvement.

## Goal 4

### Enhance our relationships with all key stakeholders

#### Department of Justice and Equality

Throughout 2017, there were many meetings with the parent Department on specific issues relating to FSI and to the change initiative in the Department of Justice and Equality. Thus there were multiple meetings in relation to the DNA Database, the need to be Prüm compliant, performance agreements and ICT and infrastructural needs with particular emphasis on the urgent need for a new purpose built facility. In addition FSI participated in Criminal Justice Sector meetings horizon meetings and interoperability programs that focus on innovation and integration across the criminal justice sector.

## An Garda Síochána

Many of the meetings with An Garda Síochána (AGS) are operational in nature and consist of various interactions at all levels of the organisation with issues that arise in case work, particularly in complex cases. Many meetings took place in 2017 between FSI and the NFCO (National Forensic Coordination Office) which acts as the link between FSI and AGS in relation to all matters relating to the national DNA Database. FSI also provided speakers for training courses and for the Commissioner conference and attended the regional senior managers' conferences. Several meetings also took place in 2017 on the planned merger of the Garda National Technical Bureau and the design of the new laboratory at the Backweston campus.

Interactions with AGS will remain a priority in 2018 for operational, strategic planning and shared initiatives.

## Staff

FSI held a business planning day at Dublin Castle in early 2017, to develop detailed plans for the year. Two climate surveys were completed over the course of the year, including a broader Civil Service survey. Some action has been generated from these, particularly in relation to staffing levels and retention.

## Sexual Assault Treatment Units

Sexual Assault Treatment Units (SATUs) provide specialist care for people who have been recently sexually assaulted or raped. There are six units throughout the country and as part of their remit they are responsible for obtaining forensic evidence. FSI supports SATUs by providing evidence recovery kits and guidelines on their use, advising on anti-contamination protocols, monitoring background DNA levels and providing FSI scientists for SATU staff training courses. FSI are members of the SATU Liaison group and the National Guidelines group.

## Public

- FSI staff participated in a number of media activities, as well as university lectures on the relevance and application of forensic techniques.
- A twitter account has been in use within FSI throughout 2017 and is used to disseminate interesting content on forensic applications.
- Staff delivered lectures during Science week also in 2017.
- Staff spoke at Missing persons Day at Farmleigh in December 2017 and facilitated relatives giving DNA samples.

## Visitors

In May 2017 a seminar was held in Farmleigh House to mark the launch of the first Annual DNA Database report. Speakers included Professor Christophe Champod of Lausanne University, Switzerland and Professor Tom Inglis, UCD. The theme of the seminar was around forensic science, past, present and future. Professor Christophe Champod and Professor Tacha Hicks (also of Lausanne University) visited FSI during this seminar.



# DNA DATABASE

# Goal 1

## Further develop and enhance our service delivery by the operation of the DNA Database

The DNA Database commenced operation on the 20<sup>th</sup> November 2015 and its implementation is one of the most important crime fighting tools introduced within the State in recent times. Using the database, information is supplied to the Gardaí about links between people and unsolved crimes. These crimes have ranged from burglary/criminal damage to crimes against the person, sexual assault/suspicious deaths. The power of the database as an investigative tool is that it is providing Gardaí with investigative leads in previously unsolved serious crimes. The database can replace more traditional and time consuming police investigative methods and provide more focus to a criminal investigation. It is now also possible to retain samples from relatives of missing persons to aid in the investigation of unknown remains.

### Number of persons' profiles added to the DNA Database System

Figure 6 shows the number of profiles from persons uploaded to the DNA Database from the date of commencement. In total 21,330 profiles were added by the end of December 2017.

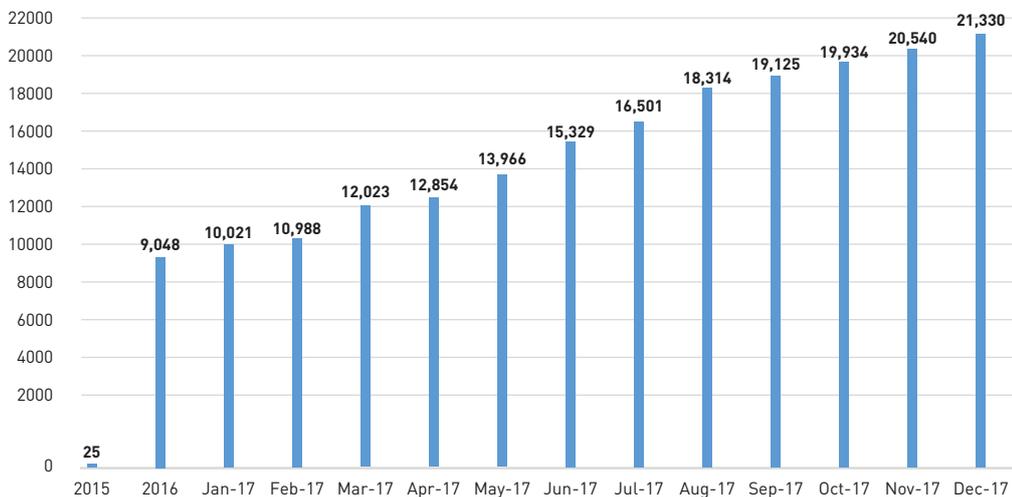


Figure 6 - Cumulative number of profiles uploaded to the database each month to the end of 2017

Figure 7 shows the various acts under which the samples from persons were taken.

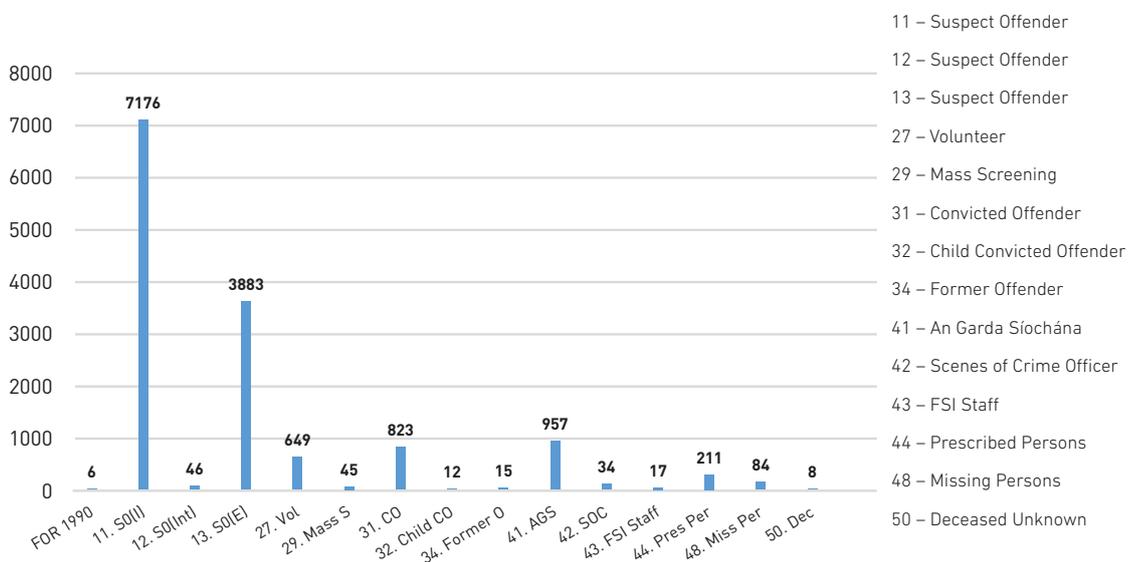


Figure 7 - Sections of the Act under which persons' samples were taken

### Number of unsolved crime stains added to the DNA Database System

Since commencement of the Database 4,042 unsolved crime stains were added to the crime stain index (as of the end of December 2017).

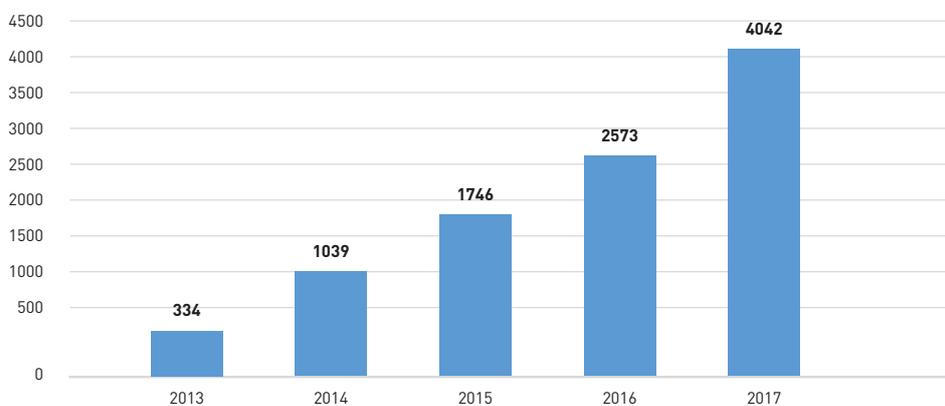


Figure 8 - Cumulative number of crime stains uploaded to the Database to the end of 2017

### Sample destruction and profiles removal from the DNA Database System

FSI is responsible for the destruction/retention of samples and removal of DNA profiles from the DNA Database as requested by the Commissioner of An Garda Síochána and in accordance with Part 10 of the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014

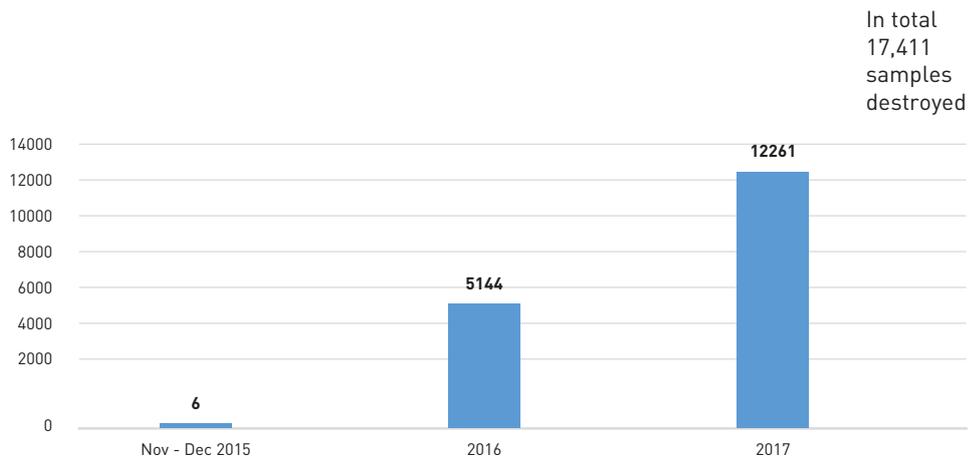


Figure 9 - Number of samples destroyed since commencement of the DNA Database

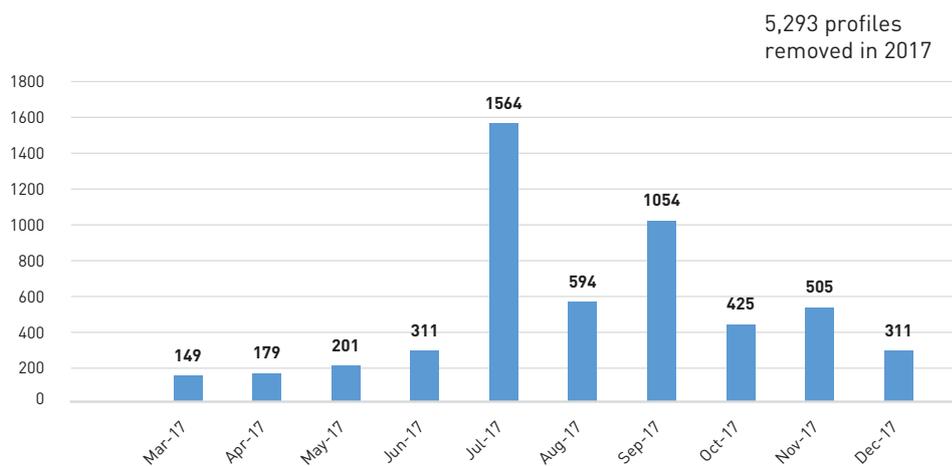


Figure 10 - Number of profiles removed from the DNA Database system in 2017

## Investigative links:

Two potential matches can occur when an additional profile is added to the database – a crime stain can match another crime stain suggesting a link between crimes or the crime stain can match to a person suggesting a link between the person and the crime. Overall, the DNA Database identified 601 hits in 2017 which assisted 913 cases. The types of hits are detailed below:

### (a) Crime scene samples linked to other crime scene samples

This type of match occurred 66 times in 2017. In 58 such cases, a case to case match was reported while in the other 8 cases, there were clusters of cases associated with each other. Overall this resulted in 138 investigative links ('hits') between unsolved crime stains - see Figure 11 below

Case Type	Number
Burglary	63
Criminal damage	22
Unlawful taking of vehicle	11
Robbery/ theft	16
Assault	3
Explosive/Firearm	5
Armed Robbery	4
Drugs	2
Other	12
Total	138

Figure 11 - Unsolved stain to stain matches in 2017 (138 investigations)

### (b) Persons linked to crime stains

There were 535 person-to-stain matches in 2017 - 478 of these were person to single case matches providing assistance to 478 investigations while in 57 cases the person was linked to multiple case matches providing assistance to 297 investigations. In total 775 cases have been aided by the operation of the DNA Database in 2017. The details of the cases involving person to stain matches is available on Fig 12. 81% of the profiles that matched stains originated from samples taken from suspects while 18% originated from convicted offenders.

Case Type	Number
Burglary	405
Sexual Assault	20
Criminal damage	75
Unlawful taking of vehicle	47
Robbery/ theft	68
Armed Robbery	9
Murder/Attempted	10
Drugs	28
Other	113
Total	775

Figure 12 - Person to Stain Matches (Types of Investigations and the number of each involved in 2017)

- Metrics used internationally to assess the effectiveness of databases are available in Figures 13 and 14. These figures were as of the end of February 2018 and they are well within the norms of functioning databases and are indicative that the database is performing well.

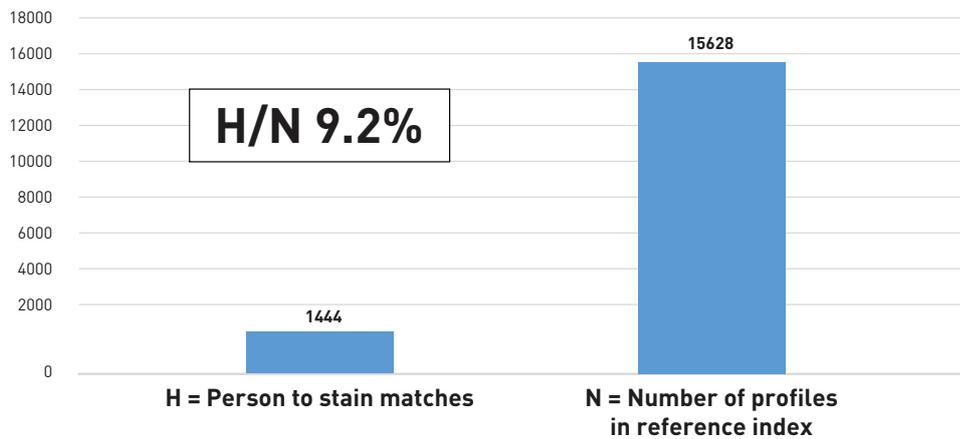


Figure 13 - This figure indicates the appropriateness of the sampling policy (i.e. sampling suspected offenders and convicted offenders).

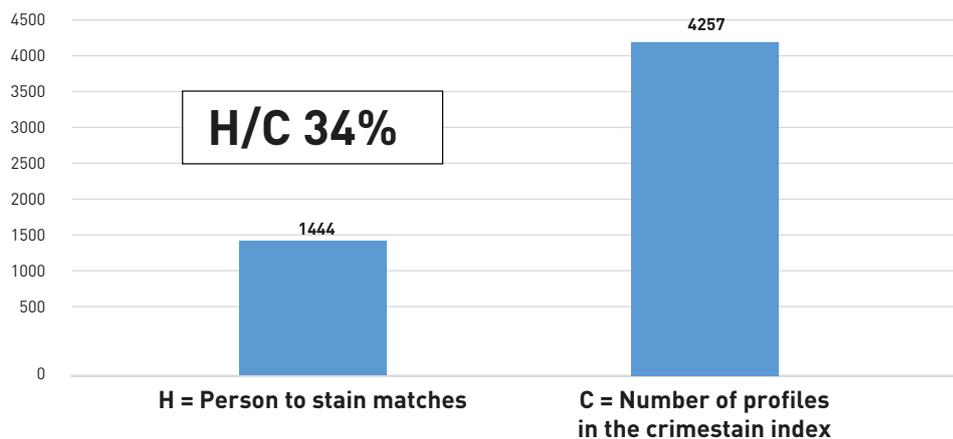


Figure 14 - This measures the crime solving capacity and is expected to grow as the database grows (i.e. 34 out of every 100 crime scene samples uploaded onto the database will be linked to a person).

# Corporate Governance

FSI confirms its compliance with the relevant requirements of the Code of Practice for the Governance of State Bodies. In particular, FSI confirms that:

1. The Oversight Agreement for 2017 has been reached with the Department of Justice and Equality and that, as a non-statutory body without a Board, FSI is compliant with the relevant requirements of the Code of Practice for the Governance of State Bodies.
2. FSI is adhering to the relevant aspects of the Public Spending Code.
3. FSI has implemented a risk management system which identifies and reports key risks and the management actions being taken to address and, to the extent possible, to mitigate those risks. A risk register is in place which identifies the key risks facing FSI and these have been identified, evaluated and graded according to their significance. The principal risks identified for FSI in 2017, and associated mitigation strategies are summarised below.
  - a) Demand and capacity are not matched across multiple disciplines within FSI, risking incomplete, erroneous or late reporting of cases for court. This risk is being managed currently through a prioritisation process agreed with An Garda Síochána and reflected in the Service Level Agreement between both organisations. Requirements for increased capacity and addressing support gaps are being reflected in a workforce planning process in 2018.
  - b) Delays in recruitment and gaps across job levels present a risk for case reporting and support functions at FSI. This has been managed by prioritising cases as well as support roles and focusing on most critical needs. Further mitigations are planned in 2018, including recruitment across job levels.
  - c) Contamination risks based on building/facility design is being mitigated through contamination control and workflow processes. The new building design offers a robust mitigation of this risk.

# Statement of Internal Control

## Scope of Responsibility

On behalf of Forensic Science Ireland, I acknowledge responsibility for ensuring that an effective system of internal control is maintained and operated. This responsibility takes account of the requirements of the Code of Practice for the Governance of State Bodies (2016).

## Purpose of the System of Internal Control

The system of internal control is designed to manage risk to a tolerable level rather than to eliminate it. The system can therefore only provide reasonable and not absolute assurance that assets are safeguarded, transactions are authorised and properly recorded and that material errors or irregularities are either prevented or detected in a timely way.

The system of internal control, which accords with guidance issued by the Department of Public Expenditure and Reform has been in place in Forensic Science Ireland for the year ended 31 December 2017.

## Capacity to Handle Risk

Forensic Science Ireland reports on all audit matters to the Audit Committee in the Department of Justice and Equality. The Audit Committee in the Department of Justice and Equality met 5 times in 2017. Forensic Science Ireland's senior management team acts as the Risk Committee for the body and completed training from the Department of Justice and Equality on risk management in 2017. Senior managers from Forensic Science Ireland completed a risk register in 2017 and shared the findings with the Department of Justice and Equality.

The Internal Audit Unit of the Department of Justice and Equality carry out audits on financial and other controls in Forensic Science Ireland. It carries out a programme of audits each year.

Forensic Science Ireland's senior management team has developed a risk management policy which sets out its risk appetite, the risk management processes in place and details the roles and responsibilities of staff in relation to risk. The policy has been issued to all staff who are expected to work within Forensic Science Ireland's risk management policies, to alert management on emerging risks and control weaknesses and assume responsibility for risks and controls within their own area of work.

## Risk and Control Framework

Forensic Science Ireland has implemented a risk management system which identifies and reports key risks and the management actions being taken to address and, to the extent possible, to mitigate those risks.

A risk register is in place which identifies the key risks facing Forensic Science Ireland and these have been identified, evaluated and graded according to their significance. The register is reviewed and updated by the senior management team biannually. The outcome of these assessments is used to plan and allocate resources to ensure risks are managed to an acceptable level.

The risk register details the controls and actions needed to mitigate risks and responsibility for operation of controls assigned to specific staff.

I confirm that a control environment containing the following elements is in place:

- procedures for all key business processes have been documented;
- financial responsibilities have been assigned at management level with corresponding accountability;
- there is an appropriate budgeting system with an annual budget which is kept under review by senior management;
- there are systems aimed at ensuring the security of the information and communication technology systems, The ICT division of the Department of Justice and Equality provide Forensic Science Ireland with ICT services. They have provided an assurance statement outlining the control processes in place in 2017 in respect of the controls in place;
- there are systems in place to safeguard Forensic Science Ireland's assets. Control procedures over grant funding to outside agencies ensure adequate control over approval of grants and monitoring and review of grantees to ensure grant funding has been applied for the purpose intended;
- The National Shared Services Office provide Human Resource and Payroll Shared services. The National Shared Services Office provide an annual assurance over the services provided. They are audited under the ISAE 3402 certification processes.

## Ongoing Monitoring and Review

Formal procedures have been established for monitoring control processes and control deficiencies are communicated to those responsible for taking corrective action and to management, where relevant, in a timely way. I confirm that the following ongoing monitoring systems are in place:

- key risks and related controls have been identified and processes have been put in place to monitor the operation of those key controls and report any identified deficiencies;
- an annual audit of financial and other controls is carried out by the Department of Justice and Equality's Internal Audit Unit;
- reporting arrangements have been established at all levels where responsibility for financial management has been assigned; and
- there are regular reviews by senior management of periodic and annual performance and financial reports which indicate performance against budgets/forecasts.

## Procurement

I confirm that Forensic Science Ireland has procedures in place to ensure compliance with current procurement rules and guidelines and that during 2017 Forensic Science Ireland complied with those procedures.

## Review of Effectiveness

I confirm that Forensic Science Ireland has procedures in place to monitor the effectiveness of its risk management and control procedures. Forensic Science Ireland's monitoring and review of the effectiveness of the system of internal financial control is informed by the work of the internal and external auditors, the Audit Committee, and the senior management team. The senior management within Forensic Science Ireland is responsible for the development and maintenance of the internal financial control framework.

I confirm that Forensic Science Ireland conducted an annual review of the effectiveness of the internal controls for 2017. It should be noted that this extended beyond financial controls and examined ICT controls, management practices and other governance processes.

## Internal Control Issues

No weaknesses in internal control were identified in relation to 2017 that require disclosure in the financial statements.

# Appendix 1

## Forensic Literature Contributions

Casey DG; Domijan K; MacNeill S; Rizet D; O'Connell D; Ryan J. *The persistence of sperm and the development of time since intercourse (TSI) guidelines in sexual assault cases at Forensic Science Ireland, Dublin, Ireland.* *J Forensic Sci.* 2017 May;62(3): 585-592.

Corina C.G. Benschop, Edward Connolly, Ricky Ansell, Bas Kokshoorn. *Results of an inter and intra laboratory exercise on the assessment of complex autosomal DNA profiles.* *Science & Justice, Volume 57, Issue 1, 2017, Pages 21-27.*

Kristy Steensma, Ricky Ansell, Lindy Clarisse, Edward Connolly, Ate D. Kloosterman, Louise G. McKenna, Roland A.H. van Oorschot, Bianca Szkuta, Bas Kokshoorn. *An inter-laboratory comparison study on transfer, persistence and recovery of DNA from cable ties.* *Forensic Science International: Genetics, Volume 31, 2017, Pages 95-104.*

Fernandes, Daniel; Sirak, Kendra; Novak, Mario; Finarelli, John; Byrne, John; Connolly, Edward; Carlsson, Jeanette; Ferretti, Edmondo; Pinhasi, Ron; Carlsson, Jens. (2017). *The Identification of a 1916 Irish Rebel: New Approach for Estimating Relatedness From Low Coverage Homozygous Genomes.* *Scientific Reports.* 7, Article number: 41529.

The following papers were also published in 2017, while Dr John Power from FSI was completing his PhD Thesis.

John D. Power, Pierce V. Kavanagh, Gavin McLaughlin, Michael Barry, Geraldine Dowling, Simon D. Brandt. *'APAAN in the neck' A reflection on some novel impurities found in seized materials containing amphetamine in Ireland during routine forensic analysis.* *Drug Testing and Analysis.* 2017, 9, 966-976. DOI: 10.1002/dta.2194

Gavin McLaughlin, Noreen Morris, Pierce V. Kavanagh, John D. Power, Geraldine Dowling, Brendan Twamley, John O'Brien, Gary Hessman, Brian Murphy, Donna Walther, John S. Partilla, Michael H. Baumann, Simon D. Brandt. *Analytical characterization and pharmacological evaluation of the new psychoactive substance 4-fluoromethylphenidate (4F-MPH) and differentiation between the (±)-threo and (±)-erythro diastereomers.* *Drug Testing and Analysis.* 2017, 9, 347-357. DOI: 10.1002/dta.2167

Gavin McLaughlin, Noreen Morris, Pierce V. Kavanagh, John D. Power, Geraldine Dowling, Brendan Twamley, John O'Brien, Brian Talbot, Donna Walther, John S. Partilla, Michael H. Baumann, Simon D. Brandt. *Synthesis, characterization and monoamine transporter activity of the new psychoactive substance mexedrone and its N-methoxy positional isomer, N-methoxymephedrone.* *Drug Testing and Analysis.* 2017, 9, 358-368. DOI: 10.1002/dta.2053

Gavin McLaughlin, Noreen Morris, Pierce V. Kavanagh, Geraldine Dowling, John D. Power, Brendan Twamley, John O'Brien, Brian Talbot, Harald H. Sitte, Simon D. Brandt. *Test purchase, synthesis and characterization of 3-fluorophenmetrazine (3-FPM) and differentiation from its ortho- and para-substituted isomers.* *Drug Testing and Analysis.* 2017, 9, 369-377. DOI: 10.1002/dta.1945.

Power JD, Kavanagh P, McLaughlin G, Dowling G, Barry M, O'Brien J, Talbot B, Twamley B, Brandt SD. *Forensic analysis of P2P derived amphetamine synthesis impurities: identification and characterization of indene by-products.* *Drug Test Anal.* 2017 Mar;9(3):446-452. doi: 10.1002/dta.1944. Epub 2016 Jan 15.







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